



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/673,375	09/30/2003	Anthony Dip	243476US6YA	4360
22850	7590	06/01/2005	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			HARRISON, MONICA D	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 06/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/673,375

Applicant(s)

DIP ET AL.

Examiner

Monica D. Harrison

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-46 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 4, 5, 7, 8, 10-24, 27-30, and 34-46 are rejected under 35 U.S.C. 102(e) as being anticipated by Seutter et al (2003/0215570 A1).

1. Regarding claim 1, Seutter et al discloses a method of depositing a silicon-containing film on a substrate, the method comprising: providing a substrate in a process chamber of a processing system (pg.2, paragraph 0020); heating the substrate (pg. 7; examples 1 and 3); exposing a HCD process gas to the substrate (pg.2, paragraph 0022), and depositing a silicon-containing film on the substrate (pg.2, paragraph 0022; *silicon precursor*).

2. Regarding claim 2, Seutter et al discloses wherein the exposing comprises exposing an inert gas to the substrate (pg.2, paragraph 0022).

3. Regarding claim 4, Seutter et al discloses wherein the exposing further comprises exposing a hydrogen-containing gas to the substrate (pg.2, paragraph 0022).

4. Regarding claim 5, Seutter et al discloses wherein the exposing further comprises exposing H₂ to the substrate (pg.2, paragraph 0022).

5. Regarding claim 7, Seutter et al discloses wherein the exposing further comprises exposing a second silicon-containing gas to the substrate (pg.2, paragraph 0022).

Art Unit: 2813

6. Regarding claim 8, Seutter et al discloses wherein the exposing further comprises exposing at least one of SiH_4 , SiCl_4 , Si_2H_6 , and SiH_2Cl_2 to the substrate (pg.2, paragraph 0022).

7. Regarding claim 10, Seutter et al discloses wherein the exposing further comprises exposing a hydrogen-containing gas and a second silicon-containing gas to the substrate (pg.2, paragraph 0022).

8. Regarding claim 11, Seutter et al discloses wherein the exposing further comprises exposing H_2 and at least one of SiH_4 , SiCl_4 , Si_2H_6 , and SiH_2Cl_2 to the substrate (pg.2, paragraph 0022).

9. Regarding claim 12, Seutter et al discloses wherein the exposing further comprises exposing a HCD gas and at least one of a phosphor-containing gas, a boron-containing gas, and a nitrogen-containing gas to the substrate (Figure 2A, reference 210; *nitrogen*).

10. Regarding claim 13, Seutter et al discloses wherein the exposing further comprises exposing a HCD gas and at least one of PH_3 , B_2H_6 , BCl_3 , and NH_3 to the substrate (pg.2, paragraph 0022; *NH₃*).

11. Regarding claim 14, Seutter et al discloses wherein the exposing further comprises exposing a halogen-containing gas to the substrate (pg.4, paragraph 0031).

12. Regarding claim 15, Seutter et al discloses wherein the exposing further comprises exposing at least one of HF , F_2 , Cl_2 , and HCl to the substrate (pg.4, paragraph 0031).

13. Regarding claim 16, Seutter et al discloses wherein the exposing further comprises exposing a germanium-containing gas to the substrate (pg.2, paragraph 0023).

Art Unit: 2813

14. Regarding claim 17, Seutter et al discloses wherein the exposing further comprises exposing a at least one of a hydrogen-containing gas, a dopant gas, and a halogen-containing gas substrate (pg.2, paragraph 0022; NH_3).

15. Regarding claim 18, Seutter et al discloses wherein the exposing further comprises exposing at least one of GeH_4 and $GeCl_4$ to the substrate (pg. 2, paragraph 0023).

16. Regarding claim 19, Seutter et al discloses wherein the exposing further comprises exposing a hydrogen-containing gas and a germanium-containing gas to the substrate (pg.2, paragraph 0023).

17. Regarding claim 20, Seutter et al discloses wherein the exposing further comprises exposing H_2 and GeH_4 to the substrate (pg.2, paragraph 0023).

18. Regarding claim 21, Seutter et al discloses wherein the depositing comprises selectively depositing an epitaxial silicon-containing film on a silicon substrate (pg.2, paragraph 0019).

19. Regarding claim 22, Seutter et al discloses wherein the depositing comprises non-selectively depositing a polycrystalline silicon-containing film or an amorphous silicon-containing film on a substrate (pg.2, paragraph 0019).

20. Regarding claim 23, Seutter et al discloses wherein the exposing comprises exposing a HCD process gas including HCD gas and a germanium-containing gas to the substrate; and the depositing comprises depositing a SiGe-containing film on the substrate (pg.2, paragraphs 0022-0023).

21. Regarding claim 24, Seutter et al discloses wherein the depositing comprises selectively depositing a SiGe-containing film on a silicon surface (pg.2, paragraph 0023).

22. Regarding claim 27, Seutter et al discloses wherein the heating comprises heating the substrate to between about 500C and about 900C (pg.5, paragraph 0037).

23. Regarding claim 28, Seutter et al discloses wherein the heating comprising heating the substrate to between about 700C and about 900C (pg.5, paragraph 0037).

24. Regarding claim 29, Seutter et al discloses wherein the heating comprises heating the substrate to a temperature of about 800C and the depositing comprises selectively depositing an epitaxial silicon-containing film on a silicon surface of the substrate (pg. 5, paragraph 0037).

25. Regarding claim 30, Seutter et al discloses wherein the heating comprises heating the substrate to a temperature of about 700C and the depositing comprises non-selectively depositing a silicon-containing film on the substrate (pg.5, paragraph 0037).

26. Regarding claim 34, Seutter et al discloses pretreating the substrate prior to exposing a HCD process gas to the substrate (pg.5, paragraph 0037).

27. Regarding claim 35, Seutter et al discloses wherein the pretreating comprises exposing a H₂ gas to the substrate at a substrate temperature between about 500C and about 1000C (pg.5, paragraph 0037).

28. Regarding claim 36, Seutter et al discloses wherein the pretreating comprises exposing a H₂ gas to the substrate at a substrate temperature of about 900C (pg.5, paragraph 0037).

29. Regarding claim 37, Seutter et al discloses wherein a computer readable medium containing program instructions for execution on a processor, which when executed by the processor, cause a processing apparatus to perform the steps in the method recited in claim 1 (Figure 1).

30. Regarding claim 38, Seutter et al discloses a system for processing a substrate, comprising: means for providing a substrate in a process chamber of a processing system (Figure 1, pg. 2, paragraph 0020); means for heating the substrate (pg.2, paragraph 0020) means for exposing a HCD process gas to the substrate to deposit a silicon-containing film on the substrate (pg.2, paragraph 0020; *first and second precursor*).

31. Regarding claim 39, Seutter et al discloses a processing tool for depositing a silicon-containing film on a substrate comprising: a processing system (Figure 6, reference 1106) a transfer system configured to provide the substrate in a process chamber of the processing system (Figure 6, references 902 and 1028; pg.6, paragraph 0044) a heater for heating the substrate (pg.7, tables 1 and 3; *heater temp or substrate heater*) a gas injection system configured to expose a HCD process gas to the substrate in the processing system (Figure 6, reference 3014) and a controller configured to control the processing tool (Figure 6).

32. Regarding claim 40, Seutter et al discloses wherein the processing system comprises a batch type processing system or a single wafer processing system (Figure 6).

33. Regarding claim 41, Seutter et al discloses wherein the processing system comprises a batch type processing system containing a process tube (pp.7-8, examples 1-5).

34. Regarding claim 42, Seutter et al discloses wherein the processing system comprises a thermal processing system, a plasma processing system, or an atomic layer deposition system (pg.4, paragraph 0031; *atomic layer deposition*).

35. Regarding claim 43, Seutter et al discloses further comprising a processing system configured for pretreating the substrate (pg.7, tables 1 and 3; *heater temp or substrate heater*).

Art Unit: 2813

36. Regarding claim 44, Seutter et al discloses further comprising a process monitoring system (Figures 1 and 6).

37. Regarding claim 45, Seutter et al discloses wherein the gas injection system is configured to expose a HCD process gas comprising HCD and an inert gas and at least one of a hydrogen-containing gas, a silicon-containing gas, and a germanium-containing gas to the substrate (pg.5, paragraph 0037).

38. Regarding claim 46, Seutter et al discloses wherein the gas injection system is configured to expose a HCD process gas comprising HCD and an inert gas and at least one of a dopant gas and a halogen-containing gas to the substrate (pg.4, paragraph 0031; *chlorine*).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3, 6, 9, 25, 26 and 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seutter et al (2003/0215570 A1).

39. Seutter et al discloses the flow rates of HCD, inert gas (claim 3; pg.2, paragraph 0021), hydrogen-containing gas (claim 6; pg. 2, paragraph 0022), silicon containing gas (claim 9; pg.2, paragraph 0022) (pg.5, paragraph 0037), germanium film (claims 25 and 26; pg.2, paragraph 0023), and providing the process chamber pressure (claims 31-33; pg.2, paragraph 0020) however, Seutter et al does not disclose the specified flow rates, percentage of germanium film, nor the process chamber pressure.

Art Unit: 2813

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to provide the flow rates of 5sccm–1,000sccm and 5sccm–20,000sccm (claim 3), 5sccm–5,000sccm (claim 6), 5sccm–1000sccm (claim 9), making the germanium film above or below two atomic percent (claims 25 and 26) and the pressure within the process chamber being less than 100 Torr (claim 31), 10 Torr (claim 32), and about .4 Torr (claim 33) since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the “optimum range” involves only routine skill in the art. *In re Aller*, 105 USPQ 233 (1955).

Response to Arguments

40. Examiner withdraws election/restriction requirement.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica D. Harrison whose telephone number is 571-272-1959. The examiner can normally be reached on M-F 7:00am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2813

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Monica D. Harrison
AU 2813

mdh
May 25, 2005



CRAIG THOMPSON
PRIMARY EXAMINER